CHAPTER 16

COMPRESSED AIR SYSTEMS

16-1. Minimum maintenance activities for compressed air systems

The tables that follow indicate items that must be performed to maintain systems and equipment at a minimum level of operational readiness. The listed minimum action items should be supplemented by manufacturer-recommended maintenance activities and procedures for specific pieces of equipment. Frequencies listed are typical for mid-life equipment that has been well maintained. Users may need to modify the frequencies to reflect factors such as the age and condition of equipment at the facility, and the physical arrangement of the facility.

16-2. General maintenance procedures for compressed air systems

The facility operator should use the following action sheets as a guide in conjunction with the maintenance manuals to develop a comprehensive maintenance plan for the facility. Maintenance actions included in this section are for various modes of operation, subsystems, or components. Table 16-1 provides maintenance information for compressors. Table 16-2 provides maintenance information for compressed air systems. Table 16-3 provides maintenance information for compressed air starting systems. Table 16-4 provides maintenance information for compressed air system instrumentation and electrical.

16-3. General instructions

This section presents general instructions for maintaining the types of compressors found at Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) sites.

a. Inspect compressed air system. Start at the compressor air intakes and follow the compressed air system piping all the way to the points of end use. Inspect for the following.

(1) Leaking pipe joints and/or corrosion

(2) Missing identification tags on system valves and components

(3) Sagging or misalignment of piping

(4) Compressed air leaks (use a sonic leak detector)

(5) High-pressure drops across valves and equipment

(6) Drive misalignment and worn drive components

(7) High temperatures

(8) Dirty heat transfer surfaces

(9) Plugged strainers, filters, and drains

(10) Excessive oil and water in clean air streams

b. Exercise valves. Exercise all valves in the compressed air system.

(1) Inspect packing gland and tighten if necessary.

(2) Check for correct positioning and operation.

(3) Check for leaking seals.

(4) Adjust operator linkages and limit switches on control valves.

c. Test alarms. Verify that the horns sound and all annunciator lights illuminate by pressing the appropriate test push buttons. Press the ACKNOWLEDGE and RESET push buttons when proper operation has been confirmed.

d. Inspect air dryer for proper operation. Obtain an operating and maintenance manual from the manufacturer of the equipment installed and follow manufacturer's recommendations. Include inspection of any pre-filter and after-filter elements as part of the dryer inspection.

Table 16-1. Compressors

Compressors	
Action	***Frequency***
Compressor Intake Air Filter	
Verify intake air filter is free of obstructions.	week
For viscous and dry type air filters, check pressure drop across filter and clean or replace as required.	week
For oil bath type filters:	
Check level of oil in bath and add oil as required.	week
Determine level of dirt in sump and remove if required (may require draining and replacing oil.	week
Area Around Compressor	
Verify that there is enough clear area around the compressor for adequate ventilation and the area is free of stored materials and debris that may interfere with the operation of the compressor.	week
Compressor Assembly	
Visually inspect the entire unit for loose connections, pulleys, couplings, leaks, etc.	week
Visually inspect leveling and drive alignment, and check tightness of all mounting bolts.	week
Verify all guard devices (belt, shaft, etc.) for tightness and proper clearance.	week
Check for any unusual noise, vibration, or overheating.	week
For belt-driven compressors, inspect belts for proper tension adjustment, drive alignment, and belt wear and replace as required.	week
For units with rotating or sliding bearings requiring lubrication (grease), lubricate bearings:	
Outdoor or portable.	mo
Indoor stationary.	3 mos
For units with lubricating oil systems:	
Check the oil level and add oil as required.	week
Change oil. (If not specified by equipment manufacturer, after 1,000 hours of operation or every 3 months, which occurs first.)	per mfg
For air cooled compressors, clean cooling surfaces by brushing, and wiping with a clean rag.	week
For water-cooled compressors, verify coolant flow and adjust flow as required.	week

Table 16-1. Compressors (continued)

Compressors	
Action	***Frequency***
Electric Motor Drives	
Check electric motor for excessive vibration or overheating, and compare operating current under load against nameplate current rating.	week
Verify that motor ventilation openings are clear; clean dirt off of motor and wipe off any moisture or grease on external surfaces.	week
For motors with bearings requiring lubrication, lubricate bearings. (If no specific manufacturer's recommendation, annually.)	per mfg
Diesel or Gasoline Engine Drives	
Monitor lube oil temperature and pressure and log as required.	hr
Monitor cooling system temperature and log as required.	hr
Check level in lube oil sump and add oil as required.	day
Check level in cooling system and add coolant as required.	day
Check engine coolant for proper level of antifreeze and corrosion inhibitors and add antifreeze and corrosion inhibitors as required.	mo
Lubricate (grease) engine and ancillary component bearings.	mo
Take lube oil sample and test for fuel contaminant level.	week
Take lube oil sample for analysis by the Army Oil Analysis Program (AOAP).	mo/250 hrs
Check pressure drop across lube oil filter and replace filter as required. (If pressure gauges not installed, replace at interval recommended by equipment manufacturer. If no equipment manufacturer's recommendation, replace with each lube oil change.)	day
Change lube oil. (Or, change at interval recommended by equipment manufacturer. If no manufacturer's recommendation, 1,000 hours of operation or every 3 months, whichever occurs first.)	per mfg
Engine air intake air filters:	
Inspect filter and service as required.	week
Clean or replace filter as required. (Or, if no manufacturer's recommendation, at every lube oil change.)	per mfg

Table 16-2. Compressed air systems

Compressed Air Systems	
Action	***Frequency***
System	
Start at the air intake to the compressor. Follow the compressed air system to each point of use. Inspect for, and report all discrepancies to, supervisor:	
Leaking pipe joints.	day
Leaking equipment (heat exchangers, air dryers, receivers, etc.).	day
Leaking packing glands and seals.	day
Incorrect system pressures or temperatures	day
Blocked or plugged drains.	day
Clean equipment, brush off loose dirt or debris, and wipe off moisture and oil.	mo
Manual Valves	
Exercise all valves and report all discrepancies to supervisor. Exercise shall include the following activities:	
Grease stems of OS&Y valves.	mo
Inspect packing gland and tighten if necessary.	mo
Check for correct position and operation.	mo
Check for leaking seals.	mo
Safety Relief Valves	
Verify safety relief valve operation by opening valve for a few seconds using the test lever (very little force should be required to open the valve using the test lever; if excessive effort is required, valve requires rebuild and adjustment).	6 mos
WARNING! THIS OPERATION REQUIRES HEARING PROTECTION AND A FULL-FACE SHIELD.	
Remove, rebuild, adjust, and recertify valve set pressure.	yr
All Strainers, Separators and Filters	
Verify that automatic trap is functioning and drain is clear; for manual drain system, drain reservoirs.	day
For particulate filters, check pressure drop across filter and clean or replace filter element as required.	week
For coalescing filters, check pressure drop across filter and visually inspect for indication that filter element is saturated and clean or replace filter element as required.	week

Table 16-2. Compressed air systems (continued)

Compressed Air Systems	
Action	***Frequency***
Receivers	
Inspect receiver and report all discrepancies to supervisor. Inspection shall include checking for:	
Verify that automatic trap is functioning and drain is clear; for manual systems, drain water. (Variable – frequency depends on operation experience.)	day
Air or moisture leaks and corrosion.	mo
Excessive moisture on floor below drain valves.	mo
Control Valves, Diaphragm Operator Force Balance	
Inspect all control valves and adjust as required, or note for future maintenance. Report all discrepancies to supervisor. Inspection shall include checking for:	
Air leaks.	mo
Erratic air pressure at inlet or outlet.	mo
Actual pressure compared to pressure setting of valve.	mo
Inter-coolers and After-coolers	
For air-cooled units:	
Verify cooling surfaces are clear of debris (waste paper, rags, packing material, etc.); clean area as required.	week
Verify cooling surfaces do not have heavy accumulations of dirt, oil, or grease; clean surfaces as required.	week
For units with electric fans, verify operation of fan, and visually inspect fan for:	
Excessive noise, vibration, or overheating.	week
Guards in place with proper clearances.	3 mos
Lubricate fan as required.	as req'd
For water-cooled units:	
Check inlet and outlet air and coolant temperatures and adjust coolant flow as required.	week
Check pressure drop across air side and water side of unit.	week
Visually inspect units for leaks or corrosion and report discrepancies to supervisor.	mo
Low Point Distribution Piping Drains	
For low point drains with automatic traps clean element in any strainer ahead of the trap; cleaning may be accomplished by slowly opening and closing the blowdown valve on the strainer. Do not complete valve closing until all water is drained.	mo

Table 16-2. Compressed air systems (continued)

Compressed Air Systems	
Action	***Frequency***
NOTE! EXCESSIVE WATER DISCHARGE MAY INDICATE THAT THE TRAP IS NOT OPENING AND REQUIRES MAINTENANCE.	
Verify that the trap drain line is clear.	mo
Drain the dirt leg by slowly opening and closing the dirt leg drain valve. Do not complete valve closing until all water is drained.	mo
Air Dryer	
General checks and inspections should be performed to verify or determine:	
Drains, if present, are clear.	day
Automatic traps are functioning.	day
Any external coolant streams are properly adjusted.	week
Operating pressure drops, and air and coolant stream temperatures are within normal ranges.	week
Motor-driven equipment operating without excessive noise or vibration, and motor is not overheating.	week

Table 16-3. Compressed air starting system

Compressed Air Starting System	
Action	***Frequency***
System	
Perform all applicable maintenance actions for compressors and compressed air systems from tables 16-1 and 16-2.	as req'd
Starting Air Lubricator	
Check oil level. When lubricator becomes half empty, fill reservoir with oil.	week
CAUTION! NEVER ALLOW THE AIR LUBRICATOR RESERVOIR TO BECOME EMPTY. THE STARTING MOTOR WILL BE DAMAGED BY LACK OF PROPER LUBRICATION.	
Adjust lubricator drip rate in accordance with manufacturer's recommendation (typically 3 to 4 drops per minute when the air motor is operating).	mo
Starting Air Strainer	
Remove, thoroughly clean, and reinstall strainer element.	3 mos
Air Motor	
Service in accordance with manufacturer's recommendations. Servicing shall include flushing air motor with approved cleaning agent to remove accumulated dirt, water, oily residues, etc.	yr

Table 16-4. Compressed air system instrumentation and electrical

Compressed Air System Instrumentation & Electrical	
Action	***Frequency***
Thermometers	
Check for accuracy. Remove thermometers from their wells and check against calibrated thermometer in controlled temperature bath.	yr
Pressure Gauges	
Isolate pressure gauge by closing the proper valves. Remove and check in a fixture against a calibrated gauge. Adjust as required following equipment manufacturer's instructions.	yr
Motors	
Check and clean cooling airflow passages on electric motors as necessary so that nothing obstructs airflow.	6 mos
All Electrical Devices	
Check, clean, and tighten terminals at motors, starters, disconnect switches, etc.	6 mos
Wiring	
Check insulation on conductors in starters, switches, and junction boxes at motors for cracks, cuts, or abrasions. Replace wiring as required and correct cause of damage.	6 mos